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U.S. PATENT APPLICATION

for

SUSPENSION FABRIC FOR SEATING

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SUSPENSION FABRIC FOR SEATING

[0001] Cross-reference to related patent application, if any: None.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0002] The present invention relates to seating covers, and more particularly to a suspension cover for a frame which results in a seat capable of supporting an occupant without the need for typical cushion, padding and support frame elements. In its most preferred embodiment, the present invention relates to a fabric cover for a seat frame which is easily and quickly placed over a frame and is subsequently heated to cause the cover to shrink to a taut condition capable of supporting a seat occupant.

DESCRIPTION OF THE PRIOR ART

[0003] A very large variety of seat covers and seating components are known for vehicle seats, home, school and office seating, theater and stadium seating, etc. Most seats include a seat frame of some type, and those seats which provide a cushion feel for the occupant further include padding, cushioning, springs, foam and/or a number of other components for comfort and/or aesthetic purposes. Other seating, such as patio furniture, may include only a frame, and strips of canvas, plastic or other materials stretched over the frame and secured in place by fasteners. Attempts have also been made to cover seating frames using a suspension fabric only, and in prior attempts the fabric cover closely

resembles its final shape and is forced over the frame to its final position. This type of assembly is both time consuming and expensive.

[0004] A problem encountered with prior suspension covers is their tendency to sag after an occupant leaves the seat. This problem results from the conflicting goals of expediting assembly and having a fabric support for a frame which does not yield substantially when the weight of an occupant is placed thereon.

[0005] The complexity of seating systems used for vehicles is aptly demonstrated by reference to certain prior art documents. For example see U.S. Patent No. 5,762,842 issued to Burchi on June 8, 1998 for "Process for Seat Production"; U.S. Patent No. 5,820,212, issued to Hoshino et al. in October 13, 1998 for "Automotive Seat"; U.S. Patent No. 5,820,213 issued to Severenski on October 13, 1998 for "Trim Cover Attachment Features"; U.S. Patent No. 5,826,939 issued to Beyer on October 27, 1998 for "Method and Apparatus for Attaching a Trim Cover to a Seat Frame"; U.S. Patent No. 5,879,051 issued to Cozanni on March 9, 1999 for "Device and Method for Fixing a Seat Covering and the Seat Obtained"; U.S. Patent No. 5,882,073 issued to Burchi et al. on March 16, 1999 for "Foam Passenger Seat Having Trim Cover Attachment Means"; U.S. Patent No. 5,887,452 issued to Smith et al. on March 30, 1999 for "Knitted Cover"; and U.S. Patent No. 5,902,434 issued to Parrish on May 11, 1999 for "Method of Bonding a Cover Material to a Foam Cushion."

[0006] As is apparent from reviewing the above-referenced disclosures, many vehicle seat arrangements are complex, involve a number of components and are time consuming and difficult to assemble. A seat which could be assembled quickly, which would be readily adaptable to a wide variety of frame constructions and which could be

prepared in a wide variety of color and graphic combinations would represent a significant advance in this art.

FEATURES AND SUMMARY OF THE INVENTION

[0007] A primary feature of the present invention is to provide a suspension fabric for seating.

[0008] Another feature of the present invention is to provide a suspension fabric which is heat shrinkable and readily adaptable to a wide variety of seat frame configurations.

[0009] A further feature of the present invention is to provide a suspension fabric for seating which reduces seat assembly time and cost.

[0010] A different feature of the present invention is to provide a suspension fabric for seating which may be prepared from a variety of different textures and colors of yarns and/or fibers and which may be woven to display graphics on the "A" side of the fabric.

[0011] Yet another feature of the present invention is to provide a suspension fabric for seating which may be woven from yarns and/or fibers selected to shrink at preselected temperatures or which may be selected to provide differing amounts of shrink to accommodate different end uses and different designs of seat frames.

[0012] Still a further feature of the present invention is to provide a suspension fabric for seating which is heat shrinkable in at least two dimensions.

[0013] How the above-mentioned and other features are accomplished individually, collectively, or in various subcombinations will be described in the following detailed description of the preferred embodiment, taken with the FIGURES. Generally, however, the features are accomplished by knitting a heat shrinkable yarn with another yarn, preferably either an air jet textured yarn or a false twist yarn into a double

jersey construction. The resulting jersey is then cut and sewn into a suspension cover for a seating frame, which cover is easily placed over the frame in its "baggy" state (a term which will be used herein to denote a state in which the cover can be slipped over a seat frame without using substantial force, even if the cover is taut resulting from stretching the knit between frame components). The suspension fabric is then heated causing the heat shrinkable components thereof to contract, preferably in at least two directions, causing the fabric to tighten over the frame to a condition in which it can support an occupant. Other ways in which the features of the invention are accomplished will appear to those skilled in the textile field and/or in the field of designing covers for seat frames, after they have read this specification. Such other ways are deemed to fall within the scope of the present invention if they fall within the scope of the claims which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] In the FIGURES, like reference numerals will be used to designate like components, and

[0015] FIGURE 1 is a schematic illustration of a seat back frame over which a baggy suspension fabric has been placed; and

[0016] FIGURE 2 is a schematic illustration of the seat back frame of FIGURE 1 after the suspension fabric has been heated.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0017] Before beginning the detailed description of the preferred embodiment of the invention, several general comments can be made about the applicability and the scope thereof. First, the invention will be illustrated in connection with the seat back covering for a vehicle seat, but the invention has much broader applicability for use in a wide variety

of seating for home, office, school, patio, airport, stadium, and theater seating, to name a few. The only requirements are that the seat include a frame and that a heat shrinkable suspension fabric is used therewith.

[0018] Second, one type of double jersey knit construction is described, but other double jersey knits can be used. At least one of the yarns used to knit the double jersey construction is heat shrinkable and another is an air jet textured microfiber yarn or a false twist yarn. The knit may be construed from two, three or more components, of which two or more may be the same yarn or fiber.

[0019] Third, preferred heat shrinkable yarns useful in the present invention are available from E.I. duPont de Nemours and Company located at Wilmington, Delaware, U.S.A., and those skilled in the fabric art can select yarns for the desired heat shrink temperature and the amount of contraction required for a particularly end use application. Similarly, preferred air jet textured microfiber yarns are available from Unifi, Inc., located at Greensboro, N.C., U.S.A. Other fibers or yarns having similar properties may be substituted therefore. False twist yarns are well known and readily available.

[0020] Fourth, patterns, graphics, logos or the like can be knit into the suspension fabric of the present invention by proper selection of the yarns and fibers, again as will readily be appreciated by those skilled in the art.

[0021] Proceeding now to a description of the preferred embodiment, "before and after" illustrations are used to inform the reader about the present invention. The bagginess of the cover shown in FIGURE 1 is exaggerated somewhat for purposes of illustration. Also, auxiliary equipment used in the process of the present invention is not shown (such as heating ovens) as they are, in and of themselves well known in the art.

[0022] FIGURE 1 shows an illustrative seating frame 10 including side rails 12, an upper rail 14 and connecting rails 16. In addition, a crossbar 18 is shown extending between the opposed side rails 12. A suspension cover 20 is shown loosely placed over frame 10. The illustrated cover includes three portions 22-24 which surround a first side rail 12, top rail 14 and the other side rail 12, respectively. The area between portions 22-23 and between 23-24 are open and do not surround connecting rails 16. This particular arrangement again is for illustrative purposes, and the suspension cover 20 could surround all of the rail portions if desired.

[0023] FIGURE 2 illustrates the same components as in FIGURE 1, but after the suspension fabric 20 has been heated above the glass transition temperature of the heat shrink yarn used to construct it. It will be noted that portions 22, 23 and 24 now are snug around side rails 12 and top rail 16 and that the bagginess of suspension cover 20 is eliminated. Suspension cover 20 is sufficiently taut to be able to support an occupant. While some give may be allowed, the suspension fabric 20 should have sufficient memory to return the cover 20 to its post-heated condition very quickly after an occupant has departed from the seat.

[0024] The particular illustrations for the preferred embodiment description use a seat back, but as previously mentioned, the invention is equally applicable to horizontal seating surfaces.

[0025] While the present invention has been illustrated in connection with a single preferred embodiment and is discussed in connection with a number of variations which may be made thereto, the invention is not to be limited to such description (e.g. with respect to sizes, dimensions, materials, or the like) but is to be limited solely by the scope of the claims which follow.